

We claim:

1. A device for positioning several objects with respect to a reference point comprising:

a base having a center;

a plurality of pointers arranged radially with respect to said center, each pointer indicating an angular position for one of said objects; and

an azimuth locating mechanism rotatably mounted on said base and including a beam generator adapted to generate a light beam, wherein said azimuth locating mechanism is adapted to position said beam generator to orient said light beam along one of said pointers thereby indicating a position for the respective object.

2. The device of claim 1 further comprising a distance calculator mounted on said azimuth locating mechanism and adapted to indicate a distance to one of said objects.

3. The device of claim 1 wherein said pointers are associated with said plate.

4. The device of claim 1 wherein said azimuth locating mechanism includes a direction indicator that indicates the orientation of said azimuth locating mechanism with respect to said pointers.

5. The device of claim 1 wherein said azimuth locating mechanism is adapted to allow said beam generator to rotate with respect to a plane parallel to the base to allow said object to be positioned in a plane offset from the base.

6. The device of claim 1 wherein said azimuth locating mechanism includes a first and a second beam generator, said beam generators being adapted to be

selectively rotatable with respect to each other, said beam generators generating images on the object to be positioned.

7. The device of claim 6 wherein said beam generators are adapted to generate spots on the object to be positioned, the relative position of the spots being indicative of the position of the object.

8. The device of claim 1 wherein said azimuth locating mechanism includes a distance indicating mechanism adapted to indicate a radial distance to the object to be positioned.

9. The device of claim 8 wherein said distance indicating mechanism is an acoustic device.

10. The device of claim 8 wherein said distance indicating mechanism is a radar device.

11. The device of claim 8 wherein said distance indicating mechanism is an optical device.

12. A device for optimal positioning a plurality of speakers of a multi-speaker sound system with respect to a reference point, said device comprising:

a base;

an azimuth locating mechanism mounted on said base and rotatable about said center point, said azimuth locating mechanism including a first beam generator adapted to generate a beam of light to indicate an angular position for said speakers; and

a distance indicator adapted to indicate when a distance between said device and a respective speaker within a predetermined range.

13. The device of claim 12 further comprising a plurality of pointers arranged radially around a center point, each pointer indicating a position for one of said speakers.

14. The device of claim 13 further comprising a location indicator adapted to indicate the relative position of said azimuth locating mechanism and said pointers.

15. The device of claim 13 wherein said base is a disk shaped plate with a top surface and wherein said pointers are arranged on said top surface.

16. The device of claim 14 wherein said base is a disk shaped plate with a side surface and wherein said pointers are arranged on said side surface.

17. The device of claim 12 further comprising a second beam generator adapted to generate a second light beam, wherein when said light beams impinge on one of said speakers, they indicate the optimal position for that speaker.

18. The device of claim 17 wherein said beam generators are laser devices.

19. The device of claim 18 wherein said beam generators are optical devices adapted to generate respective images.

20. The device of claim 17 wherein said azimuth locating mechanism includes an altitude adjustment bracket, said beam generators being mounted on said altitude adjustment bracket, said altitude adjustment bracket being movable to direct beams from said beam generators at speakers disposed in a plane spaced away from a plane of said base.

21. The device of claim 17 wherein said beam generators are adapted to generate respective beams which, when impinging on one of said speakers, are offset in a predetermined direction.

22. The device of claim 12 wherein said distance indicator comprises an acoustic device.

23. The device of claim 12 wherein said distance indicator comprises a radar device.

24. The device of claim 12 further comprising a lock adapted to secure said azimuth locating mechanism in one of several predetermined positions with respect to said base.

25. A method of locating speakers of a multi-speaker system at optimal positions with respect to a reference point, said method comprising:

placing a speaker locating device at said reference point, said speaker locating device including a beam generator rotatable about an axis passing through said reference point and generating a light beam;

placing a first speaker along a first axis passing through said reference point;

directing said light beam at said first speaker to define a reference line;

rotating said beam generator by a predetermined angle with respect to said reference line to define a second axis; and

a placing a second speaker on said second axis.

26. A method of placing a plurality of speakers at predetermined angles and a common distance from a reference point, said method comprising:

placing a speaker locating device at said reference point, said speaker

locating device including an azimuth locating mechanism including a first and a second beam generator, said beam generators being rotatable with respect to each other, said azimuth locating mechanism being rotatable about an axis passing through said reference point;

placing a first speaker in a first position spaced at said common distance from said reference point;

directing said beam generators at said first speaker along a reference axis and rotating them with respect to each other to obtain spots on said speaker having a predetermined spatial relationship;

fixing the relative position of wherein beam generators with respect to each other;

rotating azimuth locating mechanism to a position defined by a second axis at a predetermined angular offset from said reference axis;

placing a second speaker along said second axis with said spots impinging on said second speaker; and

adjusting the position of said second speaker until said spots are approximately in said predetermined spatial relationship.

27. The method of claim 26 wherein said spots are offset along a first line in said predetermined spatial relationship, said first line being transversal to said first and second axes.

28. The method of claim 26 wherein the distance between said first speaker and said reference point is determined using a separate distance detector.

29. The method of claim 26 wherein the distance between said first speaker and said reference point is determined using said speaker locating device.

30. The method of claim 26 wherein said first and second beam generators are

locked with respect to each other while said azimuth locating mechanism is rotated.

31. An object aligning device to place a plurality of objects at a predetermined position with respect to a reference point, whereby said object aligning device comprises:

- a supporting base having a center to be placed at the reference point;
- a first beam generator coupled to said supporting base and generating a first beam; and

- a second beam generator coupled to said supporting base and generating a second beam;

- said first and second generators cooperating to define a circle around said reference point by the convergence of said beams as said generators are rotated simultaneously about said reference point so that said speakers can be positioned at a common distance from said reference point by placing along said circle.

32. The object aligning device of claim 31 further comprising a first bracket joined to and being rotatable with respect to said supporting base about said reference point, said first beam generator being mounted on said first bracket.

33. The object aligning device of claim 32 further comprising a second bracket joined to the first bracket, said second beam generator being mounted on said second bracket, said second bracket being rotatable with respect to said first bracket.

34. The object aligning device of claim 33 further comprising a first locking mechanism to selectively allow the first bracket to rotate the first beam generator about the center of the supporting base and to selectively secure the bracket

from movement.

35. The object aligning device of claim 33 further comprising a second locking mechanism to selectively allow the second bracket to move said second beam generator about the center of the supporting base and to selectively secure said second beam generator from movement.

36. The object aligning device of claim 31 further comprising an elevation adjustment mechanism to adjust the position of the first and second beam generators such that the first and second reference markers selectively are moved from a plane containing said supporting base.

37. The object aligning device of claim 33 wherein the first bracket comprises an altitude adjustment mechanism to selectively adjust the first and second beam generators such that the first and second reference markers are moved from a reference plane containing the center reference point.

38. The object aligning device of claim 31 wherein the first and second beam generators are selected from a group of reference pointers consisting of laser devices, radar range detectors, ultrasonic range detectors, and optical projectors.

39. The object aligning device of claim 31 wherein the objects to be placed are speaker in a multiple speaker sound system.

40. The object aligning device of claim 31 further comprising a pedestal coupled to said supporting base to maintain the center of the supporting base at the reference point, when said reference point is at a distance from a support structure.

41. The object aligning device of claim 31 further comprising indicia placed on said supporting base indicating a primary azimuth denoting a direction to said first object and at least one secondary azimuth denoting directions corresponding to the remaining objects to be positioned.

42. A speaker aligning device to place a plurality of speakers at an equal distance from a reference point, wherein said speaker aligning device comprises:

a supporting base having a center to be placed at said reference point;

a first beam generator coupled to said supporting base;

a second beam generator coupled to said supporting base and rotatable with respect to said first beam generator;

a first lock arranged to secure said first beam generator with respect to the second beam generator while said beam generators are moving with respect to said base.

43. The speaker aligning device of claim 42 further comprising a first bracket joined to said supporting base at the center of said supporting base.

44. The speaker aligning device of claim 43 further comprising a second bracket joined to the first bracket to support the second beam generator while allowing said second beam generator to be rotated about the center of the supporting base.

45. The speaker aligning device of claim 43 further comprising a first locking mechanism to selectively allow the first bracket to move to rotate the first beam generator about the center of the supporting base and to secure the first beam generator from movement.



46. The speaker aligning device of claim 44 further comprising a second locking mechanism to selectively allow the second bracket to move to rotate the second beam generator about the center of the supporting base and to secure the second beam generator from movement.

47. The speaker aligning device of claim 42 further comprising an elevation adjustment mechanism to adjust the first and second beam generators such that the first and second reference markers selectively are moved from a plane containing said supporting base.

48. The speaker aligning device of claim 42 wherein the first bracket comprises an altitude adjustment mechanism to selectively adjust the first and second beam generators such that the first and second reference markers are moved from a reference plane containing the reference point.

49. The speaker aligning device of claim 42 wherein the first and second beam generators are selected from a group of reference pointers consisting of laser devices, radar range detectors, ultrasonic range detectors, and optical projectors.

50. The speaker aligning device of claim 42 wherein the speakers to be placed are in a surround sound system.

51. The speaker aligning device of claim 42 further comprising a pedestal coupled to said supporting base to maintain the center of the supporting base at the reference point.

52. The speaker aligning device of claim 42 further comprising indicia placed on said supporting base indicating azimuth designations for each speaker.

FIG. 40